Dec. 23, 1969 A. HUTZENLAUB 3,485,429

DEVICE FOR HEATING AND DRYING A MATERIAL WEB BY SUSPENSION IN A TUNNEL

Filed July 14, 1967 2 Sheets-Sheet 1

FIG. 1

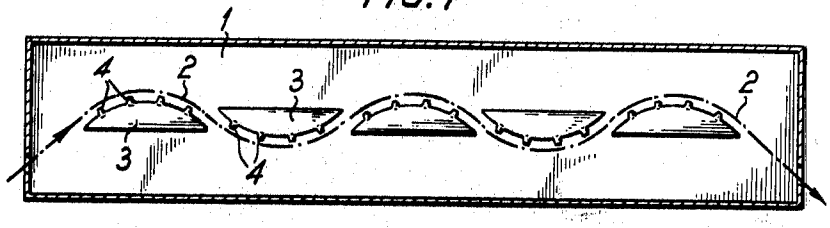


FIG. 2

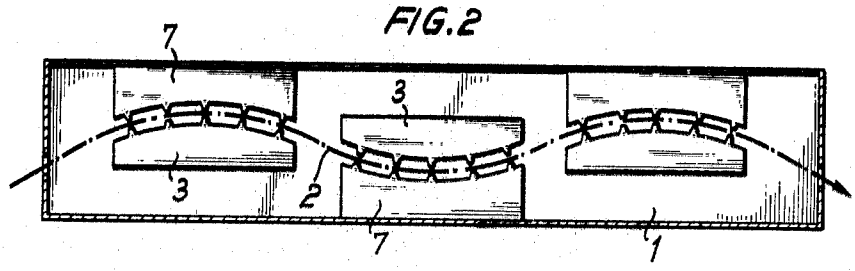


FIG. 3

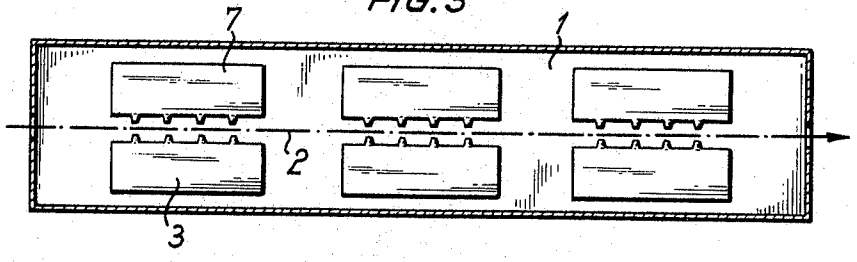
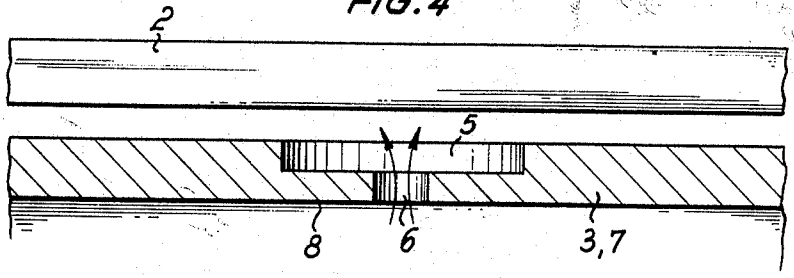


FIG. 4



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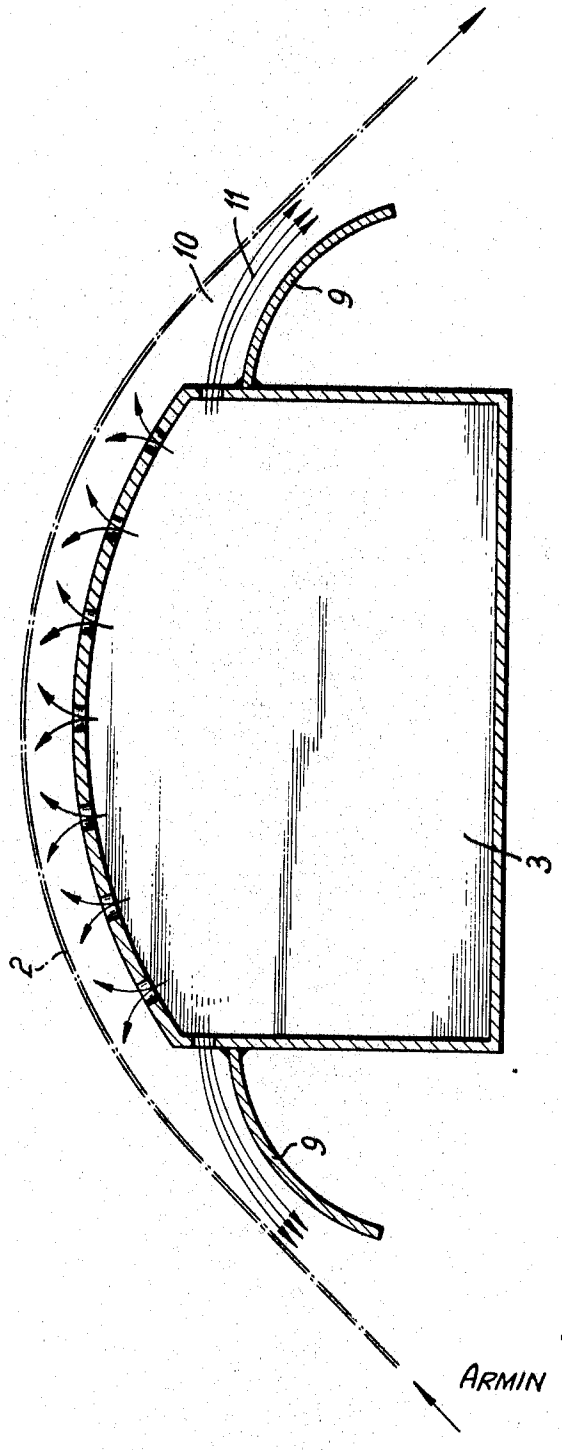
ATTORNEYS

Dec. 23, 1969 A. HUTZENLAUB 3,485,429

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Filed July 14, 1967 2 Sheets-Sheet 2

FIG. 5



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DEVICE FOR HEATING AND DRYING A MATERIAL WEB BY SUSPENSION IN A TUNNEL

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Int. Cl. B65h 17/32
U.S. Cl. 226—97 5 Claims

ABSTRACT OF THE DISCLOSURE

A process and device for heating and drying a material web by suspension in a tunnel with air nozzle assemblies arranged and designed in a way to produce air cushions causing the material web to float in an undulatory line. The air nozzle assemblies provided with lateral tangential flow of air preventing the material web from flapping before and after passing over the air nozzle assemblies.

Background of the invention

The invention relates to a tunnel wherein the material web is kept in suspension by air.

Tunnels of this general type have been used in the past but all have been subject to certain disadvantages. Such tunnels are conventionally provided with nozzles spaced relatively wide apart from another so that the running material web is subject to flapping.

Summary of the invention

According to the present invention a process is performed by means of a tunnel provided with closely spaced air nozzles on individual air nozzle assemblies. These assemblies commonly form a tunnel in form of an undulatory line. These assemblies further have lateral guide plates forcing a tangential flow of air against the material web, in this way stabilizing the running of the material and preventing disturbing air turbulances.

Brief description of the drawing

According to the invention illustrated in FIGS. 1 and 2 of the drawing, the tunnel **1** is provided with air nozzle assemblies arranged therein and the undulatory material **2** web transport and guide route is limited by the air nozzle assemblies. Further the air nozzle assemblies are arranged consecutively and the air nozzles **4** of every assembly are essentially adjacent to the air nozzles **4** of neighbouring air nozzle assemblies. The bore hole of each nozzle **4** is, as illustrated in FIG. 4, wider facing to the material web **2** than facing away from same.

In FIG. 3 the air nozzle assemblies **3** are arranged adjacent the counter nozzle assemblies **7**.

FIG. 1 and FIG. 2 illustrate alternative solutions in which the nozzle assemblies **3** above the material web commonly form a convex curve and those of the individual counter air nozzle assemblies **7** commonly form a concave curve or vice versa.

FIG. 3 illustrates also a device wherein the radius of the convex or concave curves of the air nozzle assemblies **3** and **7** above and below the material web **2** is very large, or almost infinite radius.

FIG. 4 illustrates one nozzle **4** the use of which represents an excellent advantage for all designs illustrated. The bore hole of such a nozzle illustrated in FIG. 4 is wider (at **5**) facing to the material web **2** than facing away from it (at **6**). In FIG. 4 the numeral **8** indicates the wall of an air nozzle assembly showing one nozzle **4** only but composing many nozzles **4**.

Description of the preferred embodiment

FIG. 5 illustrates the one nozzle assembly. From the sides of the air nozzle assembly, supporting air **11** flows in tangential direction against the material web section **2**. The sides of the air nozzle assemblies have guide plates **9** each forming, in combination with the web **2**, slotted nozzles **10**. The guide plates **9** are curved in the same sense as that section of the material running along them. The narrowest cross-section of the space between guide plate **9** and concave face of the material web is located between both ends of the guide plate **9**.

From the above description it will be clear that the nozzles are arranged so that they are equally spaced from the web **2** and the tips of the nozzles define a surface parallel to the path of the web. Thus, each nozzle exerts the same influence on the material by providing a cushion of air paralleling the path of the web by static pressure rather than by velocity impact.

The counterbore or enlargement **5** at the outer end of each nozzle has the effect of reducing the speed of the air to convert its velocity pressure into static pressure and thus provide an efficient cushion for the web without applying concentrated jet pressures to the material.

I claim:

1. An apparatus for supporting and guiding a web of material through a material treating tunnel as it passes along a predetermined essentially elongated sinusoidal path, comprising a plurality of support assemblies consecutively arranged on respectively opposite sides of said path in staggered relation, the assemblies on at least one side of said path comprising nozzle assemblies, each including a plurality of individual nozzles respectively having a mouth for directing air essentially transversely of said path, means for supplying air to said nozzle assemblies, the mouths of the individual nozzles of each assembly being arranged in a surface the profile of which, in direction of movement of said web of material, is arcuately convex, and means fixed relative to each of said nozzle assemblies and spaced from the nozzles thereof on opposite sides of each nozzle assembly in the direction of said path, said means being arranged transverse to said path to be disposed substantially adjacent the web to confine air to flow along said path closely adjacent the web whereby the web of material is positioned and guided by an air cushion on the one side thereof along said sinusoidal path.

2. Apparatus according to claim **1** wherein each of said assemblies is provided with further nozzles, at the leading and trailing edges thereof, arranged to direct jets of air adjacent and longitudinally of said path.

3. Apparatus according to claim **2** wherein said means comprises plates carried by each of said assemblies to extend generally along said path outwardly of said fur-

ther nozzles and curved in the same sense as said profile of said surface.

4. Apparatus according to claim 1 wherein the discharge end of each nozzle comprises a central passageway and an enlarged counterbore into which said passageway discharges its air to reduce the velocity thereof.

5. Apparatus according to claim 1 wherein said means comprises a substantially rigid plate secured to the opposite sides of each nozzle assembly.

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EDWARD G. FAVORS, Primary Examiner

U.S. Cl. X.R.

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